# SLUG NEWSLETTER

# sinclair LOUISVILLE USERS GROUP
# OCT 87

The Sinclair Louisville User Group meeting came to order on Sunday, September 13, 1987 at 2:15 PM at the Government Center on Outer Loop road.

If you have articles or programs that you wish to be included in the newsletter, please give them to Shawn Merrick. He will then edit ,if necessary, and then pass them on to our publisher, Jim Dodrill. This procedure was determined to be, the best way to submit articles or programs for publication in SLUG. Don't be a lurker, get your name in print!

The drawing was held and the winner is....Ray Manley. He had the good fortune to win the TS 1000 given away at last months meeting. We all sort of expected that since Ray's wife drew the winning ticket! (just teasing, Ray). Thanks to all who entered and watch for future raffles.

Jim Pitts continued with his series of machine code classes with an explanation and demo of how an assembler program operates with the TS 1000. Jim brought his system(?) to run the demo. He was as surprised as we were that it even worked, but the bottom line is THAT IT DID!!!!....Takes a lickin' and keeps on tickin', right Jim? Anyway we did get to see some simple machine code programs written and executed flawlessly, with output even visible on the screen. Keep those classes coming Jim, they are very helpful to all of us, all kidding aside. These are very informative and interesting parts of our meetings, and should help anyone interested in Machine Language programming.

It has been mentioned before that more participation in the meetings is necessary to keep this club going. That means ALL members , not just a select few, need to try and participate. The leaves are falling already, DON'T let your Sinclair or ADAM computer fall by the wayside also. Lets see more T/S and ADAM users at the meetings!

After Jim's class and demo, the meeting was officially ajourned at 4:00 PM. Give it your best shot and try to make the meeting next month on Sunday, November 8, 1987. We would really like to see you there before the holiday rush is on.

Bob Crecco, Secretary

| | | | |
|---|---|---|---|
| President | JIM PITTS | Editor | SHAWN MERRICK |
| Secretary | BOB CRECCO | Librarian | ED RADTKE |
| Treasurer | JOHN HAMILTION | Public Realtions | RAY MANLEY |

Coleco ADAM Review #2 by Shawn Merrick

ADAMCalc from Coleco Industries, $15

ADAMCalc is a full-featured spreadsheet program. The user creates a format for a financial report by entering formulas into cells. Then, numbers can be plugged in and the rest of the sheet will be calculated. Speculations and budgeting can be done in seconds! The worksheet can be printed or saved to the disk/tape.

Mathematical operations include addition, subtraction, multiplication, division, and exponentiation. ADAMCalc will also compute standard deviations. Several help screens can be viewed at the expense of some spreadsheet space (memory).

The WILDCARD key displays a calculator on the screen which can be used for quick number-crunching. Then the result can be saved to a spreadsheet cell! Calculator keys are input from the keyboard or the joystick keypad.

The screen options are very nice, especially for an applications program. There are sixteen combinations for the text/background colors; no more eye-strain! ADAMCalc has windows! Although ADAM's screen is only 35 digits across, up to 6 windows (sections of the sheet) can be displayed at one time. You choose where and how large each window should be.

The 64K RAM expander (optional, $45) adds one of the most amazing enhancements to this program; you can use any of the features on a sheet DURING the printout of another sheet! When a sheet is printed, ADAM copies it to the expander (if you have it) and feeds it to the printer while you continue using the program. This is especially usefull since the SmartWRITER printer only prints 10 characters per second.

There is only one bug (that I know of), and it can be avoided. Most Coleco software will let you save a new or revised file with the same name as an existing file. The original file becomes marked in the directory as a backup version, in case the new version is lost or flawed. ADAMCalc gets confused and messes the directory up. The easy way to avoid this is to delete the old version first or save it with a new filename.

A small vinyl binder is included with the 155-page manual. Overall, ADAMCalc is a bargain!

Next issue, ADAM CP/M review!

ZX-Appeal
Vancouver Sinclair Users Group

# STORING AND RECALLING SCREENS

... by Jay Mundy

Here is a fairly short but extremely powerful machine code utility that enables you to instantly store and recall up to five screens (including attributes) at the touch of a button.

Listing 1 sets up the BASIC variables and pokes the machine code routine into memory. It will automatically be erased when you type in Listing 2.

After RUNning Listing 1, type in Listing 2 and ENTER GOTO 9000. (RUN must not be used because it will wipe out the BASIC variables)

You are presented with a menu which gives you the option to either "L"- load a screen from tape, "S"- store the current screen to one of 5 memory banks, or "R"- recall one of the 5 memory banks to the screen.

Although this program uses all 24 lines of the screen, the bottom two lines are occupied by the menu.

This routine can be easily implemented into other programs but uses quite a considerable chunk of memory (about 35K).

The program and screens can by SAVEd on tape by using GOTO 9400. If you just wish to SAVE the utility (no screens), use GOTO 9500.

In case you decide to modify this program (perhaps to save memory by storing fewer screens), I have included a table indicating where the utility and various screen banks are stored in memory.

Listing 1

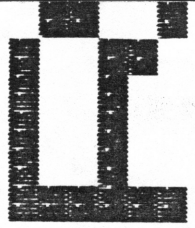
```
9000 CLEAR 30788
9100 FOR f=65350 TO 65361
9110 READ x
9120 POKE f,x
9130 NEXT f
9140 DATA 33,0,64,17,80,195,
     1,0,27,237,176,201
9200 DIM a(5)
9210 FOR f=1 TO 5
9220 READ a(f)
9230 NEXT f
9240 DATA 228,201,174,147,
     120
```

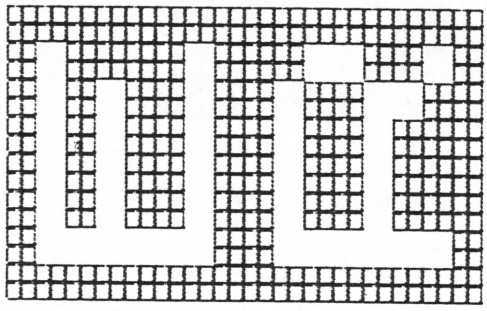
Listing 2

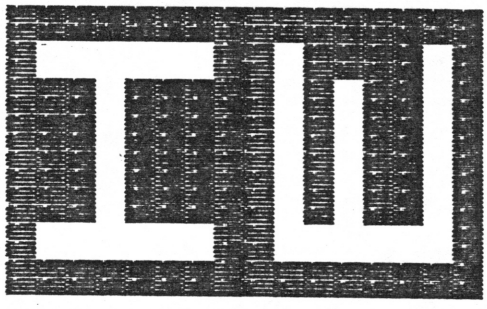
```
9000 PRINT #1;"L- LOAD    S-
      STORE    R- RECALL"
9010 LET i= PEEK 23556
9020 GOTO 9010+(90 AND i=76)
     +(190 AND i=83)+(290
     AND i=82)
9100 REM  LOAD SCREEN
9110 BEEP .2,30: INPUT ;
9120 PRINT #1; TAB 8; FLASH
     1;"LOADING SCREEN"
9130 LOAD "" SCREEN$
9140 GOTO 9000
9200 REM  STORE SCREEN
9210 BEEP .2,30: INPUT ;
9220 PRINT #1;"STORE IN WHIC
     H BANK? (1-5)"
9230 LET i$= INKEY$
9240 IF i$<"1" OR i$>"5"
     THEN  GOTO 9230
9250 POKE 65351,0:
     POKE 65352,64
9260 POKE 65354,69:
     POKE 65355,a( VAL i$)
9270 INPUT ;
9280 RANDOMIZE USR 65350
9290 GOTO 9000
9300 REM  RECALL SCREEN
9310 BEEP .2,30: INPUT ;
9320 PRINT #1;"RECALL WHICH
     BANK? (1-5)"
9330 LET i$= INKEY$
9340 IF i$<"1" OR i$>"5"
     THEN GOTO 9330
9350 POKE 65351,69:
     POKE 65352,a( VAL i$)
9360 POKE 65354,0:
     POKE 65355,64
9370 INPUT ;
9380 RANDOMIZE USR 65350
9390 GOTO 9000
9400 REM  SAVE PROGRAM
9410 SAVE "Scrnstore" LINE
     9600: SAVE "Scrnbanks"
     CODE 30789,34573
9420 GOTO 9000
9500 REM  SAVE ROUTINE
9510 SAVE "Scrnstore" LINE
     9600: SAVE "Scrncode"
     CODE 65350,12
9520 GOTO 9000
9600 LOAD "" CODE
9610 GOTO 9000
```

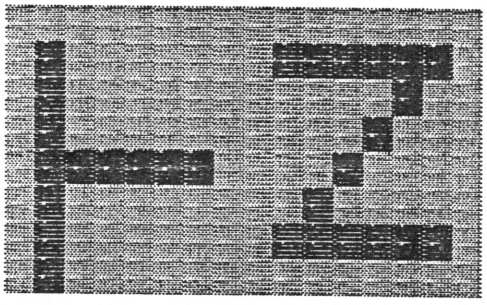
Storage table

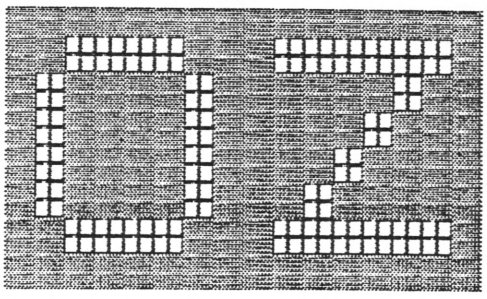
| | | |
|---|---|---|
| Utility | 65350 | - 65361 |
| Bank #1 | 58437 | - 65348 |
| Bank #2 | 51525 | - 58436 |
| Bank #3 | 44613 | - 51524 |
| Bank #4 | 37701 | - 44612 |
| Bank #5 | 30789 | - 37700 |

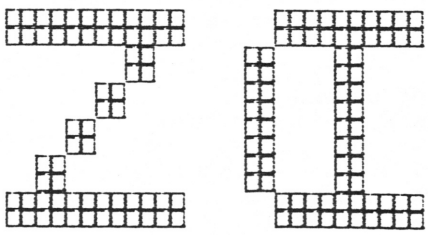


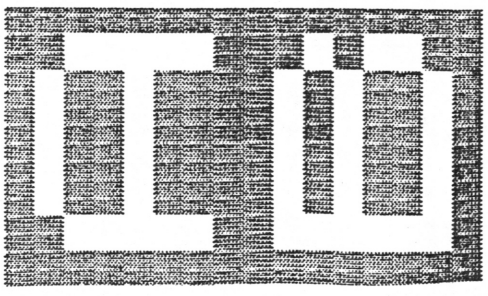












Here is another BANNER program. But this one is a bit differint. As you can see it prints two lines with a number of "INK" and "PAPER" patterns. The two lines can be up to 32 columns.

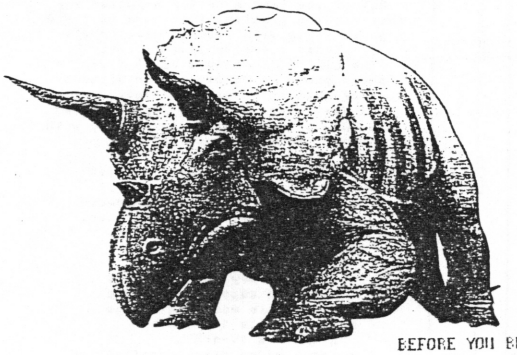
This is a very powerful program for it's size.But remember the "A" and "B" in parentheses are GRAPHICS.

I don't know the author is, but it is a job well done.

```
  5 REM *** PROGRAM "MAGNIFY11"
 10 REM *** UPDATED 1/14/84 AM
 11 DIM L$(10,1)
 12 DIM C(2)
 13 DIM A$(2,255)
 14 DIM D(2)
 15 DATA "A"
 18 DATA BIN 10101010
 20 DATA BIN 01010101
 25 DATA BIN 10101010
 30 DATA BIN 01010101
 35 DATA BIN 10101010
 40 DATA BIN 01010101
 45 DATA BIN 10101010
 50 DATA BIN 01010101
 51 DATA "B"
 52 DATA BIN 11111111
 53 DATA BIN 10000001
 54 DATA BIN 10000001
 55 DATA BIN 10000001
 56 DATA BIN 10000001
 57 DATA BIN 10000001
 58 DATA BIN 10000001
 60 DATA BIN 11111111
 65 FOR J=1 TO 2
 66 READ L$(J,1)
 67 FOR H=1 TO 8
 68 READ K
 70 POKE USR L$(J,1)+H-1,K
 75 NEXT H
 77 NEXT J
 80 INK 3
 81 CLS
 82 PRINT AT 9,0;"FOR RELIEF ST
YLE (LIGHT)  PRESS 7"
 83 PRINT AT 10,0;"FOR RELIEF S
TYLE (DARK)   PRESS 9"
 84 PRINT AT 13,6;"OTHERWISE, P
RESS ENTER"
 85 PRINT AT 14,11;"TO CONTINUE
"
 86 INPUT D$
 87 IF D$<" " THEN GO TO 93
 88 IF D$="7" THEN LET D(2)=8
 90 IF D$="9" THEN LET D(2)=10
 91 LET D(1)=VAL D$
 92 GO TO 135
 93 CLS
 94 PRINT AT 5,12;"A";"A"
 95 PRINT AT 5,18;"B";"B"
 96 PRINT AT 5,24;"▒";"▒"
 97 PRINT AT 6,12;"A";"A"
100 PRINT AT 6,18;"B";"B"
103 PRINT AT 6,24;"▒";"▒"
104 PRINT AT 8,6;1
105 PRINT AT 8,12;2
107 PRINT AT 8,18;3
108 PRINT AT 8,24;4
110 BORDER 6
112 PRINT AT 11,3;"SELECT BACKG
ROUND CHARACTER"
113 PRINT AT 13,8;"ENTER 1, 2,
3 OR 4"
114 PRINT AT 14,7;"OR ENTER 5 F
OR OTHER"
115 INPUT D(1)
116 PRINT AT 11,0;"
                  ": BORDER 5_
```

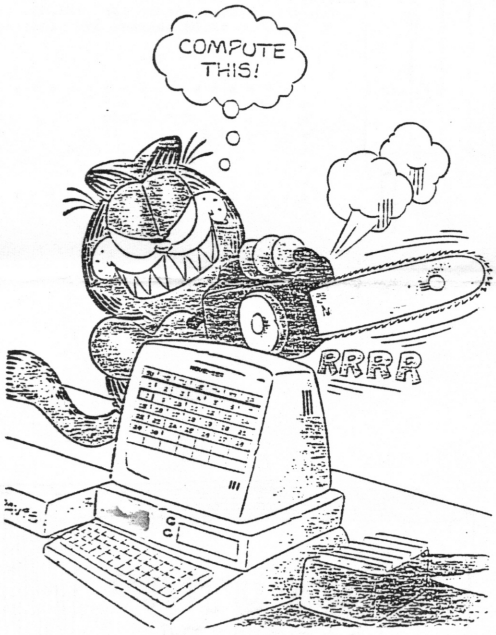
```
 117 PRINT AT 11,6;"SELECT TEXT
CHARACTER"
 118 INPUT D(2)
 120 IF D(1)=D(2) AND D(1)<>5 TH
EN GO TO 118
 121 CLS
 122 IF D(1)<5 AND D(2)<5 THEN G
O TO 135
 124 IF D(1)<5 THEN GO TO 130
 125 PRINT AT 11,3;"ENTER BACKGR
OUND CHARACTER"
 126 INPUT L$(5,1)
 127 CLS
 128 IF D(2)<5 THEN GO TO 135
 130 PRINT AT 11,6;"ENTER TEXT C
HARACTER"
 132 INPUT L$(6,1)
 133 LET D(2)=6
 135 CLS
 147 LET LENGTH=0
 150 FOR G=1 TO 2
 220 PRINT AT 11,7;"ENTER TEXT -
 LINE ";G
 230 INPUT Y$
 235 IF LEN Y$>LENGTH THEN LET L
ENGTH=LEN Y$
 240 CLS
 245 LET A$(G)=Y$
 250 NEXT G
 290 LET L$(1,1)="  "
 300 LET L$(2,1)="A"
 320 LET L$(3,1)="B"
 340 LET L$(4,1)="▀"
 350 LET L$(7,1)="▝"
 360 LET L$(8,1)="▗ "
 370 LET L$(9,1)="▖"
 380 LET L$(10,1)="▄"
 400 LET M=2
 500 LET C(1)=7
 550 LET C(2)=23
 600 LET ROW=11
 700 CLS
 750 FOR X=1 TO LENGTH
 760 INK 7
 800 PRINT AT 20,0;A$(1,X)
 810 PRINT AT 21,0;A$(2,X)
 820 INK 9
 830 GO SUB 900
 835 CLS
 840 NEXT X
 850 STOP
 900 FOR C=0 TO 7
1010 FOR N=1 TO M
1015 FOR B=0 TO 1
1020 FOR R=0 TO 7
1050 LET SWITCH=2
1100 IF POINT (C,R+B*8)=0 THEN L
ET SWITCH=1
1300 LET RCOOR=ROW-(M/2*8)+(C*M)
+N
1350 FOR L=1 TO M
1400 LET CCOOR=C(B+1)-(M/2*8)+(R
*M)+L
1450 PRINT AT RCOOR,CCOOR;L$(D(S
WITCH),1)
1460 LPRINT TAB CCOOR;L$(D(SWITC
H),1);
1475 NEXT L
1490 NEXT R
1492 NEXT B
1500 NEXT N
1700 NEXT C
1720 RETURN
9999 SAVE "MAGNIFY" LINE 1
```


# DON'T BE A BONEHEAD



SUPPORT YOUR USER GROUP

BEFORE YOU BECOME EXTINCT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NOVEMBER

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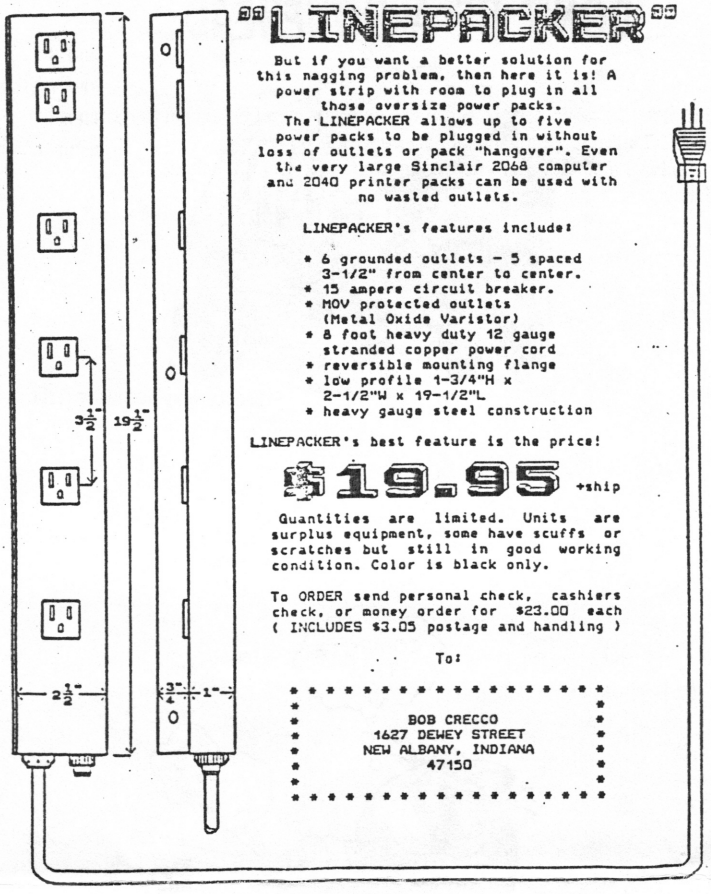
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | | | | | |
| | | | | | | |

**Tired of tackling "WHERE TO PUT THE POWER PACK" problems??**

....maybe covering an adjacent outlet?
....or hanging it off the side of the power strip?
If you don't mind these problems, then you don't need the

## "LINEPACKER"




But if you want a better solution for this nagging problem, then here it is! A power strip with room to plug in all those oversize power packs. The LINEPACKER allows up to five power packs to be plugged in without loss of outlets or pack "hangover". Even the very large Sinclair 2068 computer and 2040 printer packs can be used with no wasted outlets.

LINEPACKER's features include:

* 6 grounded outlets - 5 spaced 3-1/2" from center to center.
* 15 ampere circuit breaker.
* MOV protected outlets (Metal Oxide Varistor)
* 8 foot heavy duty 12 gauge stranded copper power cord
* reversible mounting flange
* low profile 1-3/4"H x 2-1/2"W x 19-1/2"L
* heavy gauge steel construction

LINEPACKER's best feature is the price!

**$19.95** +ship

Quantities are limited. Units are surplus equipment, some have scuffs or scratches but still in good working condition. Color is black only.

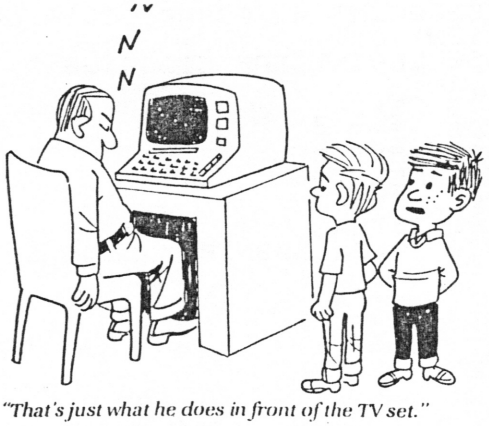
To ORDER send personal check, cashiers check, or money order for $23.00 each ( INCLUDES $3.05 postage and handling )

To:

BOB CRECCO
1627 DEWEY STREET
NEW ALBANY, INDIANA
47150


This little program will allow you to PRINT in four **fonts. With just a few GOSUBS you can switch to BOLD, MODERN**, *ITALICS*, and back to NORMAL on the same line.

```
  20 PRINT "This little program
will allow  you to PRINT in four
 ";
  25 GO SUB 9991
  30 PRINT "fonts. Withjust a fe
w GOSUBS ";
  35 GO SUB 9992
  40 PRINT "you can switchto ";:
 GO SUB 9991: PRINT "BOLD, ";: G
O SUB 9992: PRINT "MODERN, ";: G
O SUB 9993: PRINT "ITALICS,";
  45 GO SUB 9990
  50 PRINT " and    back to NORMA
L on the same line.."
9989 STOP
9990 POKE 23607,60: RETURN
9991 LET typ=2: POKE 23618,9: PO
KE 23619,39: POKE 23620,2
9992 LET typ=1: POKE 23618,9: PO
KE 23619,39: POKE 23620,2
9993 LET typ=0: RANDOMIZE USR (t
org*256+2-typ): POKE 23607,torg-
4: RETURN
9994 LET TYPE=9994: LET torg=255
: CLEAR (256*torg-769): LET torg
=255: LET reg=9990: LET REG=9990
: LET bld=9991: LET BLD=9991: LE
T mod=9992: LET MOD=9992: LET IT
IAL=9993: LET ital=9993
9995 FOR i=0 TO 79: READ k: POKE
  (i+256*torg),k: NEXT i: INPUT "
ENTER TYPE OF PRINTING
REG / MOD / BLD / ITAL :";Z: GO
SUB Z: GO TO 10
9996 DATA 0,0,121,203,39,203,39,
50,21,255,33,0,61,17,0,torg-3
9997 DATA 1,0,3,126,24,48,203,63
,24,44,230,112,24,37,121,230,7,2
03,39,50,40,255,126,24,30,24,28,
24,16,24,14,24,14,24,20,24,18,24
,2,200,63,203,63,24,10,203,39,20
3,39,24,4,183,203,39,182,18,35,1
9,11,120,177,32,196,201
9998 SAVE "PRINTING" LINE 9994:
PRINT #1;"          REWIND THE TAPE
                    *** AND PLAY **
 ": VERIFY ""
```



*"That's just what he does in front of the TV set."*

# IEEE–488 Programmable Interface

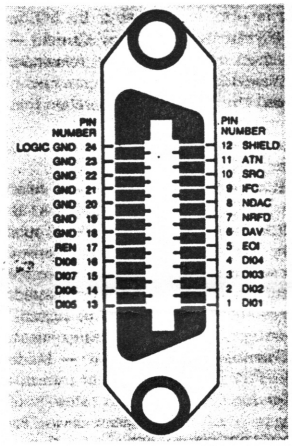
The IEEE–488 standard defines the digital interface for programmable instrumentation. The interface transmits data in a byte–serial, bit–parallel fashion among a group of instruments and system components. We have briefly described the types of devices, the bus structure, and the connector pinout of the IEEE–488 interface.

## GPIB Devices

In general, there are three types of devices connected to the GPIB bus:
1 – Talkers: the talker is a device configured to allow it to place data on the bus, transmitting it to one or more devices. Normally, there is only one talker active at a time.
2 – Listeners: the listener accepts data from the bus by means of a defined handshake sequence. The bus allows for more than one listener to be active at a time.
3 – Controller: the controller of the bus is the only device that is capable of asserting the ATN line, which tells all of the devices to get ready to accept commands. There is only one controller active at a time in the system. When two or more controllers are connected to a bus, control must be passed from one device to another.

## Bus Structure

The GPIB bus consists of 16 active lines. These are divided into three groups: data lines, control lines and handshake lines. The lines are held at +5 VDC for logical zero (false), and pulled to ground for a logical one (true).




## Data Lines

The data bus (lines DI01 through DI08) is used to allow transfer of data, control words or device addresses. The data may be of binary or ASCII types.

## Control Lines

This line is used by the controller to specify how data on the D10 lines is to be interpreted.
**IFC (Interface Clear)** — Used by the controller to place the interface system (including all interconnected devices) in a known quiescent state.
**SRQ (Service Request)** — This line is asserted by a device to indicate a need for some service sequence.
**REN (Remote Enable)** — When a controller asserts REN, the listening device will ignore its front panel controls.
**EOI (End Or Identify)** — This line has two functions: 1) It may be asserted by a talker to indicate the end of a multi–byte transfer (the END message), or 2) it is asserted by the controller in conjunction with the ATN line when executing a parallel poll.

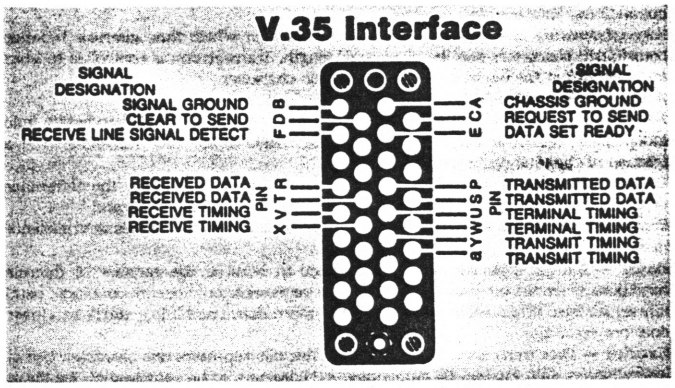
## Handshaking Lines

The handshake bus consists of three lines used to exchange data across the GPIB.
**DAV (Data Valid)** — This handshake line is asserted by a controller to indicate that it has placed a control byte on the data bus.
**NRFD (Not Ready For Data)** — This line is asserted by an active listener to stop any new data or control bytes from being placed on the bus until it is ready to accept the next byte. The controller or talker monitors this handshake line and waits until it is deasserted before sending the next byte.
**NDAC (No Data Accepted)** — This handshake line is asserted by the listener to indicate that it has not yet accepted the last byte that was placed on the bus.

# V.35 Data Interchange Interface

V.35 is the CCITT standard for data transmission at 48 Kbps per second using 60–108 KHz group band circuits. The interface is typically used on DTE or DCE equipment interfacing to a high–speed digital carrier such as AT&T's Dataphone® Digital Service (DDS).

We have included a physical connector diagram and a chart of the signals and signal directions for convenient reference.




| PIN | NAME | To DTE | To DCE | FUNCTION |
|---|---|---|---|---|
| A | FG | | | Frame (or protective) ground |
| B | SG | | | Signal (or reference) ground |
| C | RTS | | → | Request to send |
| D | CTS | ← | | Clear to send |
| E | DSR | ← | | Data set ready |
| F | RLSD | ← | | Received line signal |
| H | DTR | | → | Data terminal ready |
| J | RI | ← | | Ring indicator |
| K | LT | | → | Local test |
| R | | | | Received data (Sig. A) |
| | RD | ← | | |
| T | | | | Received data (Sig. B) |
| V | | | | Serial Clock receive (Sig. A) |
| | SCR | ← | | |
| X | | | | Serial Clock receive (Sig. B) |
| P | | | | Send data (Sig. A) |
| | SD | | → | |
| S | | | | Send data (Sig. B) |
| U | | | | Serial Clock Xmit Ext. (Sig. A) |
| | SCTE | | → | |
| W | | | | Serial Clock Xmit Ext. (Sig. B) |
| Y | | | | Serial Clock Transmit (Sig. A) |
| | SCT | ← | | |
| a | | | | Serial Clock Transmit (Sig. B) |
| h, i, j, k, m, n | | | | Unused |
| L, M, N, Z, b, c, d, f, g | | | | Unused |

**ACK** — A control character sent to acknowledge that a transmission block has been received.

**Acoustic Coupler** — A device that converts electrical signals into audio signals, enabling data to be transmitted over the public telephone network via a conventional telephone handset.

**Active/Passive Device** — In current loop applications, a device capable of supplying the current for the loop (active) and a device that must draw its current from connected equipment (passive).

**Address** — A unique designation for the location of data or the identity of an intelligent device; allows each device on a single communications line to respond to its own message.

**ANSI (American National Standards Institute)** — The principal standards development body in the U.S.A. ANSI is a nonprofit, nongovernmental body supported by over 1000 trade organizations, professional societies and companies. U.S.A.'s member body to ISO (International Standards Organization).

**ARQ (Automatic Request for Repetition)** — The character sequence that allows automatic retransmission when an error is detected.

**ASCII (American Standard Code for Information Interchange)** — Pronounced *asky*. A seven-bit-plus-parity code established by ANSI to achieve compatibility between data services.

**Asynchronous Transmission** — Transmission in which time intervals between transmitted characters may be of unequal length. Transmission is controlled by start and stop bits at the beginning and end of each character.

**Attenuation** — The decrease in magnitude of a signal.

**Band Splitter** — A multiplexor designed to split the available bandwidth into independent narrower band subchannels, each suitable for data transmission at a fraction of the total channel's data rate.

**Bandwidth** — The range of frequencies available for signaling; the difference expressed in Hertz between the highest and lowest frequencies of a band.

**Baseband Modems** — A line driver or short haul modem. (See limited distance modem.)

**Baud** — Unit of signaling speed. The speed in baud is the number of discrete conditions or events per second. If each event represents only one bit condition, baud rate equals bps. When each event represents more than one bit (e.g. dibit), baud rate does not equal bps.

**Baudot** — Data transmission code in which five bits represent one character. Use of letters/figures shift enables 64 alphanumeric characters to be represented. Baudot is used in many teleprinter systems with one start bit and 1.42 stop bits added.

**BCC (Block Check Character)** — The result of a transmission verification algorithm accumulated over a transmission lock. It is normally added to the end; e.g. CRC, LRC.

**BEL** — A control character that is used when there is a need to call for attention; it may control alarm or attention devices.

**Bell** — AT&T standards for devices that transmit over telephone lines; e.g. modems.

**Bell 212** — An AT&T modem-providing, full-duplex, asynchronous or synchronous, 1200 bps data transmission for use on the public telephone network.

**Bell 43401** — AT&T publication that defines requirements for data transmission over limited-distance DC-continuous private metallic circuits supplied by the phone company.

**Bisynchronous Transmission (BSC)** — A byte- or character-oriented IBM communications protocol that has become the industry standard. It uses a defined set of control characters for synchronized transmission of binary coded data between stations in a data communications system.

**Bit (Binary Digit)** — Contraction of "binary digit," the smallest unit of information in a binary system; a one or zero condition.

**Bit Error Rate/Block Error Rate Testing (BERT/BLERT)** — An error-checking technique that monitors a signal as it is sent down a transmission line.

**Block Check Character** — Used to check transmission accuracy, a character transmitted by the sender after each message block and compared with a block check character computed by the receiver.

**BPS (Bits Per Second)** — Unit of data transmission rate.

**Break-Out Box (BOB)** — A testing device that permits the user to cross and tie leads using jumper wires.

**Broadband** — A communications channel with a bandwidth greater than a voice-grade channel and potentially capable of greater transmission rates.

**Buffer** — A temporary-storage device used to compensate for a difference in data rate and data flow between two devices (typically a computer and a printer); also called a spooler.

**Bus** — A data path shared by many devices (e.g. multipoint line) with one or more conductors for transmitting signals, data or power. In LAN technology, a bus is a type of linear network topology.

**Byte** — A binary element string functioning as a unit, usually shorter than a computer "word." Eight-bit bytes are most common. Also called a "character."

**CAN (Cancel)** — A character indicating that the data preceding it is in error and should be ignored.

**Carrier Detect** — Same as Received Line Signal Detector. An RS-232 modem signal that indicates to an attached terminal that the modem is receiving a signal from a remote modem.

**CCITT (Consultative Committee International Telegraph and Telephone)** — An international association that sets worldwide communications standards (e.g. V.21, V.22, V.22 bis).

**Central Office** — The building in which common carriers terminate customer circuits (also known as central exchange).

**Character** — Letter, numeral, punctuation, control figure or any other symbol contained in a message.

**Clamping Voltages** — The "sustained" voltage held by a clamp circuit at some desired level.

**Clear To Send (CTS)** — Modem interface signal that indicates to the DTE device to begin transmission.

**Clock** — Shorthand term for the source(s) of timing signals used in synchronous transmission. More generally: the source(s) of timing signals sequencing electronic events.

**Cluster** — A collection of terminals or other devices in a single location.

**Common Carrier** — A private data communications utility company that furnishes communications services to the general public.

**Communications Protocol** — The rules governing the exchange of information between devices on a data link.

**Composite Link** — The line or circuit connecting a pair of multiplexors or concentrators; the circuit carrying multiplexed data.

**Concentrator (Statistical Multiplexor)** — A device used to divide a data channel into two or more channels of lower average speed, dynamically allocating channel space according to demand in order to maximize throughput.

**Conditioning** — The addition of equipment to a leased voice-grade channel, enabling the channel to meet specifications for data transmission.

**Console** — The device used by an operator, system manager or maintenance engineer to monitor or control computer, system or network performance.

**Contention** — The facility provided by the dial network or a data PABX which allows multiple terminals to compete on a first-come, first-served basis for a smaller number of computer ports.

**CPU (Central Processing Unit)** — Portion of a computer that directs the sequence of operations and initiates the proper commands to the computer for execution.

**CR (Carriage Return)** — An ASCII or EBCDIC control character that moves the cursor or print mechanism to the left margin.

**CRC (Cyclic Redundancy Check)** — An error-detection scheme in which the block check character is the remainder after dividing all the serialized bits in a transmission block by a predetermined binary number.

**Crossed Pinning** — Configuration that allows two DTE devices or two DCE devices to communicate.

**Crosstalk** — The unwanted transmission of a signal on a channel that interferes with another adjacent channel.

**CA1 (Cathode Ray Tube)** — A television-like picture tube used in a terminal; commonly used as a synonym for CA1 terminal.

**CTS (Clear to Send)** — An RS-232 modem interface control signal which indicates that the attached DTE may begin transmitting.

**Current Loop** — Method of interconnecting terminals and transmitting signals, whereby a mark (binary 1) is represented by current on the line and a space (binary 0) is represented by the absence of current.

**Data Integrity** — A performance measure based on the rate of undetected errors.

**Data Terminal Ready (DTR)** — Modem interface signal which alerts the modem that the DTE device is ready for transmission.

**DC (Device Control)** — A category of control characters primarily intended for turning on or off a subordinate device. Samples of DC characters are: DC1, DC2, DC3, etc. (See X-ON and X-OFF.)

**DCE (Data Communications Equipment)** — Devices that provide the functions required to establish, maintain and terminate a data transmission connection; e.g. a modem.

**DDD (Direct Distance Dialing)** — A telephone service in North America that enables a subscriber to call other subscribers outside his local area without operator assistance.

**DDS (Dataphone® Digital Service)** — An AT&T communications service in which data is transmitted in digital rather than analog form, thus eliminating the need for modems.

**Demodulation** — The process of retrieving digital (computer) data from a modulated analog (telephone) signal.

**Dial Network** — A network that is shared among many users, any one of whom can establish communication between desired points, when required, by use of a dial or pushbutton telephone.

**Dibit** — A group of two bits. The four possible states for a dibit code are 00, 01, 10, and 11.

**Differential Phase Shift Keying (DPSK)** — The modulation technique used in the Bell 201 modem.

**Digital Data** — Information transmitted in a coded form (from a computer) represented by discrete signal elements.

**DIP Switches** — Switches for opening and closing leads between two devices. When a lead is opened, a jumper wire can be used to cross or tie it to another lead.

**Downloading** — The process of sending configuration parameters, operating software or related data from a central source to remote stations.

**DSR (Data Set Ready)** — An RS-232 modem interface control signal which indicates that the terminal is ready for transmission.

**DSU (Digital Service Unit)** — The interface between a user's data DTE device and a digital data service, usually via a CSU.

**DTE (Data Terminal Equipment)** — Devices acting as data source, data sink, or both.

**DTMF (Dual-Tone Multiple-Frequency)** — The audio signaling frequency on touchtone, pushbutton telephones.

**DTR (Data Terminal Ready)** — An RS-232 modem interface control signal which indicates to the modem that the terminals are ready for transmission.

**Dumb Terminal** — Both hard-copy and VDT type ASCII asynchronous terminals that do not use a data transmission protocol and usually send data one character at a time.

**Duplex Transmission** — See Full Duplex.

**EBCDIC (Extended Binary Coded Decimal Interchange Code)** — An eight-bit character code used primarily in IBM® equipment. The code allows for 256 different bit patterns.

**Echoplex** — A method of checking data transmission accuracy by returning characters to the sending station for verification of data integrity.

**EIA (Electronic Industries Association)** — A standards organization in the USA specializing in the electrical and functional characteristics of interface equipment.

**EIA-485** — The recommended standard of the Electronic Industry Association that specifies the electrical characteristics of generators and receivers for use in balanced digital multipoint systems.

**EMI/RFI (Electro Magnetic Interference/Radio Frequency Interference) Filtering** — Protection from "background noise" that could alter or destroy data transmission.

**Emulation** — The imitation of a computer system, performed by a combination of hardware and software, that allows programs to run between incompatible systems.

**ENQ (Enquiry)** — A transmission control character used as a request for a response from a remote station.

**EOT (End of Transmission)** — A transmission control character used to indicate the conclusion of the transmission of one or more texts.

**EPROM** — Read-only, non-volatile, semi-conductor memory that is erasable via ultra-violet light and reprogrammable. See PROM and ROM.

**ESC (Escape)** — A control character which is used to provide additional control functions. It alters the meaning of a limited number of continuously following bit combinations.

**ETB (End of Transmission Block)** — A transmission control character used to indicate the end of a transmission block of data.

**ETX (End of Text)** — A transmission control character that terminates a text.

**Even Parity** — A "dumb" terminal data verification method in which each character must have an even number of "on" bits.

**FCC** — Federal Communications Commission.

**FDX** — See Full Duplex.

**FE (Format Effectors)** — Category of control characters mainly intended for the control of the layout and positioning of information on printing and/or display devices. Samples of FE characters are: BS, CR, FF, HT, LF and VT.

**Figures Shift (FIGS)** — A physical shift in a terminal using baudot code which enables the printing of numbers, symbols, upper case characters, etc.

**Firmware** — A computer program or software stored permanently in PROM or ROM or semi-permanently in EPROM.

**Flow Control** — The procedure for regulating the flow of data between two devices; prevents the loss of data once a device's buffer has reached its capacity.

**Frequency-Division Multiplexor (FDM)** — A device that divides the available transmission frequency range into narrower banks, each of which is used for a separate channel.

**Frequency Shift Keying (FSK)** — A frequency modulation technique in which one frequency represents a mark and a second frequency represents a space.

**Front-End Processor** — A computer designed for communications control of a mainframe.

**FS (File Separator, IS4)** — A control character used to separate and qualify data logically; normally delimits data item called a file.

**Full Duplex (FDX)** — Simultaneous, two-way, independent transmission in both directions (4-wire).

**GS (Group Separator, IS3)** — A control character used to separate and qualify data logically; normally delimits data item called a group.

**Half Duplex (HDX)** — Transmission in either direction, but not simultaneous (2-wire).

**Handshaking** — Exchange of predetermined signals between two devices establishing a connection. Usually part of a communications protocol.

**HDLC (High-Level Data Link Control)** — The international standard communication protocol defined by ISO.

**HDX** — See Half Duplex.

**Header** — The control information added to the beginning of a message — either a transmission block or a packet.

**Hertz (Hz)** — A measure of frequency or bandwidth. The same as cycles per second.

**Hexadecimal Number System** — The number system with the base of sixteen. In hexadecimal, the first ten digits are 0-9 and the last six digits are represented by the letters A-F.

**IEEE (Institute of Electrical and Electronic Engineers)** — An international professional society that issues its own standards and is a member of ANSI and ISO.

**Interface** — A shared boundary defined by common physical interconnection characteristics, signal characteristics and meanings of interchanged signals.

**Interleave** — To send blocks of data alternately to two or more stations on a multipoint system, or to put bits or characters alternately into the time slots in a TDM (Time Division Multiplexor).

**IS (Information Separator)** — A category of control characters used to separate and qualify data logically; its specific meaning has to be defined for each application. Samples of IS characters are: IS1(US), IS2(RS), IS3(GS) and IS4(FS).

**ISO** — International Standards Organization.

**ITB (Intermediate Block Character)** — A transmission control character that terminates an intermediate block. A Block Check Character (BCC) usually follows. Use of ITBs allows for error checking of smaller transmission blocks.

**Joule** — A unit of energy expended when a force of one newton (a unit of measurement) moves the point of application one meter in the direction of the force. (1 watt = 1 joule/second)

**KSR (Keyboard Send/Receive)** — A combination teleprinter transmitter and receiver with transmission capability from keyboard only.

**LDM (Limited Distance Modem)** — A signal converter which conditions and boosts a digital signal so that it may be transmitted much further than a standard RS-232 signal.

**LED (Light Emitting Diode)** — A semiconductor light source that emits visible light or invisible infrared radiation.

**Leased Line** — A telephone line reserved for the exclusive use of leasing customers, without interexchange switching arrangements. Also called a Private Line.

**Letters Shift** — A physical shift in a terminal using baudot code, enabling the printing of alphabetic characters.

**Line Driver** — A signal converter that conditions a digital signal to ensure reliable transmission over an extended distance.

**Line Turnaround** — The reversing of transmission direction from sender to receiver or vice versa when using a half-duplex circuit.

**Loaded Line** — A telephone line equipped with loading coils to add inductance in order to minimize amplitude distortion.

**Local Area Network (LAN)** — A data communications system confined to a limited geographic area (up to 6 miles or about 10 kilometers) with moderate to high data rates (100 Kbps to 50 Mbps). The area served may consist of a single building, a cluster of buildings or a campus-type arrangement. The network uses some type of switching technology, and does not use common carrier circuits — although it may have gateways or bridges to other public or private networks.

**Local Line, Local Loop** — A channel connecting the subscriber's equipment to the line terminating equipment in the central office. Usually a numeric circuit (either 2-wire or 4-wire).

**Loopback** — Type of diagnostic test in which the transmitted signal is returned to the sending device after passing through all, or a portion of, a data communications link or network. A loopback test permits the comparison of a returned signal with the transmitted signal.

**LRC (Longitudinal Redundancy Check)** — An error-detection scheme in which the check character consists of bits calculated on the basis of odd and even parity for all the characters in the block.

**Mainframe** — A large-scale computer system that can house comprehensive software and several peripherals.

**Mark** — Presence of signal. In telegraph communication, a mark represents the closed condition or current flowing. A mark impulse is equivalent to a binary 1.

**Mean-Time-Between-Failures (MTBF)** — The average length of time that a system or component works without failure.

**Mean-Time-to-Repair (MTTR)** — The average time it takes between system failure and repair.

**Menu** — The list of available software functions for selection by the operator, displayed on the computer screen once a software program has been entered.

**Mnemonic Code** — Instructions for the computer written in a form that is easy for the programmer to remember. A program written in mnemonics must be converted to machine code prior to execution.

**Modem (Modulator-Demodulator)** — A device used to convert serial digital data from a transmitting terminal to a signal suitable for transmission over a telephone channel, or to reconvert the transmitted signal to serial digital data for acceptance by a receiving terminal.

**Modem Eliminator** — A device used to connect a local terminal and a computer port in lieu of the pair of modems that they would ordinarily connect to; allows DTE-to-DTE data and control signal connections otherwise not easily achieved by standard cables or connectors.

**Modulation** — Modifying some characteristics of a wave form.

**Multidrop Line** — A single communications circuit that interconnects many stations, each of which contains terminal devices.

**Multiplexor** — A device used for division of a transmission facility into two or more subchannels, either by splitting the frequency band into narrower bands (frequency division) or by allotting a common channel to several different transmitting devices one at a time (time division).

**Multipoint Line** — A single communications line or circuit interconnecting several stations; usually requires some kind of polling mechanism to address each connected terminal with a unique address code.

**NAK (Negative Acknowledgement)** — A control character used to indicate that the previous transmission block was in error and the receiver is ready to accept retransmission.

**Node** — A point of interconnection to a network. Normally, a point at which a number of terminals or tail circuits attach to the network.

**NRZ (Non-Return-to-Zero)** — Pulses in alternating directions for successive 1 bits; no change from existing bias for 0 bits.

**Null Modem** — A device that connects two DTE devices directly by emulating the physical connections of a DCE device.

**Overhead Bit** — A bit other than a data bit, e.g., check bit, framing bit, parity bit.

**PABX (Private Automatic Branch Exchange)** — A user-owned, automatic telephone exchange that accommodates the transmission of calls to and from the public telephone network.

**Packet** — A group of bits (including data and call control signals) transmitted as a whole on a packet-switched network. Usually smaller than a transmission block.

**PAD (Packet Access Device)** — An interface between a terminal or computer and a packet-switching network.

**Parallel Transmission** — Transmission mode that sends a number of bits simultaneously over separate lines (e.g. eight bits over eight lines) to a printer. Usually unidirectional.

**Parity Bit** — A bit that is set at "0" or "1" in a character to ensure that the total number of 1 bits in the data field is even or odd.

**Parity Check** — The addition of noninformation bits that make up a transmission block to ensure that the total number of 1s is always either even (even parity) or odd (odd parity); used to detect transmission errors.

**Phase Modulation** — One of three ways of modifying a sine wave signal to make it "carry" information. The sine wave or "carrier" has its phase changed in accordance with the information to be transmitted.

**Point-to-Point (Link)** — A connection between two, and only two, pieces of equipment.

**Polling** — A means of controlling devices on a multipoint line.

**Port** — A computer interface capable of attaching to a modem for communicating with a remote terminal.

**Private Line** — A telephone line that does not go through the central office and is reserved for exclusive use of a single customer.

**PROM (Programmable Read Only Memory)** — Nonvolatile memory chip that allows a program to reside permanently in a piece of hardware.

**Protocol** — A formal set of conventions governing the formatting and relative timing of message exchange between two communicating systems.

**Public Switched Network** — Any switching communications system - such as Telex, TWX or public telephone networks - that provides circuit switching to many customers.

**Pulse Dialing** — Older form of phone dialing, utilizing breaks in DC current to indicate the number being dialed.

**Pulse Trap** — A device that monitors any RS-232 lead for changes in logic levels (high to low or low to high).

**Queue** — A waiting line or area.

**RAM (Random Access Memory)** — Semiconductor read-write volatile memory. Data stored is lost if power is turned off.

**Received Line Signal Detector** — Modem interface signal, defined in RS-232, that indicates to the attached data terminal equipment that it is receiving a signal from the distant modem.

**Redundancy Check** — A technique of error detection involving the transmission of additional data related to the basic data in such a way that the receiving terminal, by comparing the two sets of data, can determine the probability that an error has occurred in transmission.

**Request-to-Send (A1S)** — An RS-232 modem interface signal (sent from the DTE to the modem on pin 4) which indicates that the DTE has data to transmit.

**Response Time** — The elapsed time between the generation of the last character of a message at a terminal and the receipt of the first character of the reply. It includes terminal delay and network delay.

**Ring Indicator** — Modem interface signal defined in RS-232 which indicates to the attached data terminal equipment that an incoming call is present.

**RO (Receive-Only)** — A teleprinter receiver with no transmission capability.

**ROM (Read-Only Memory)** — Nonvolatile semiconductor memory manufactured with predefined data content, permanently stored.

**RS (Record Separator, IS2)** — A control character used to separate and qualify data logically; it usually delimits a data item called a record.

**RS-232** — Interface between data terminal equipment and data communication equipment employing serial binary data interchange.

**RS-422** — Electrical characteristics of balanced-voltage digital interface circuits.

**RS-423** — Electrical characteristics of unbalanced-voltage digital interface circuits.

**RS-449** — General-purpose 37-pin and 9-pin interface for data terminal equipment and data circuit-terminating equipment employing serial binary data interchange.

**RS-485** — See EIA-485.

**A1S (Request to Send)** — Physical modem interface control signal from DTE, requesting clearance to transmit.

**RVI (Reverse Interrupt)** — A control character transmitted by a receiving station to request termination of the current transmission because of another high-priority message it must send.

**SDLC (Synchronous Data Link Control)** — IBM® standard protocol superseding BSE.

**Serial Transmission** — The most common transmission mode; in serial, information bits are sent sequentially on a single data channel.

**Shielding** — Protective covering that eliminates electromagnetic and radio frequency interference.

**Short Haul Modem** — A signal converter which conditions a digital signal to ensure reliable transmission over DC continuous private line metallic circuits without interfering with adjacent pairs in the same telephone cable.

**SI (Shift-In)** — A control character used in conjunction with SO (Shift-Out) and ESC (Escape) to extend the graphic character set of the code.

**Simplex Transmission** — Data transmission in one direction only.

**SO (Shift-Out)** — A control character used in conjunction with SI (Shift-In) and ESC (escape) to extend the graphic character set of the code.

**Software** — A computer program or set of programs held in some kind of storage medium and loaded into read/write memory (RAM) for execution. (Compare with firmware and hardware.)

**SOH (Start of Header)** — A transmission control character used as the first character of a heading of an information message.

**Space** — Absence of signal. In telegraph communications, a space represents the open condition or no current flowing. A space impulse is equivalent to a binary 0.

**Start Bit** — In asynchronous transmission, the first bit or element in each character, normally a space, which prepares the receiving equipment for the reception and registration of the character.

**Statistical Multiplexor** — A device that allows a single channel to carry information from multiple devices simultaneously.

**Status Activity Monitor (SAM)** — A testing device that provides full break-out box functions in addition to LED monitoring for indicating low or high lead activity.

**Stop Bit** — In asynchronous transmission, the last bit, used to indicate the end of a character; normally a mark condition, which serves to return the line to its idle or rest state.

**Straight-Through Pinning** — RS-232 and RS-422 configuration that matches DTE to DCE, pin for pin (e.g. pin 1 with pin 1, pin 2 with pin 2).

**STX (Start of Text)** — A transmission control character that precedes a text and is used to terminate a heading.

**SUB (Substitute Character)** — A control character used in the place of a character that has been found to be invalid or in error.

**Switched Line** — A communications link for which the physical path may vary with each usage, such as the public telephone network.

**SYN (Synchronous Idle)** — A transmission control character used by synchronous transmission system in the absence of any other character (idle condition), to provide a signal.

**Synchronous Modem** — Modem that carries timing information with data.

**Synchronous Terminal** — A data terminal that operates at a fixed rate with transmitter and receiver in synchronization.

**Synchronous Transmission** — Transmission in which data bits are sent at a fixed rate, with the transmitter and receiver synchronized. Synchronized transmission eliminates the need for start and stop bits.

**Tail Circuit** — A feeder circuit or an access line to network node.

**TC (Transmission Control)** — Category of control characters intended to control or facilitate transmission of information over telecommunication networks. Samples of TC characters are: ACK, DLE, ENQ, EOT, ETB, ETX, NAK, SOH, STX and SYN.

**Telex® (Teleprinter Exchange)** — A teleprinter dial network offered by Western Union and the International Record Carriers. Uses baudot code.

**Termination** — Placement of a connector on a cable.

**Time-Division Multiplexor (TDM)** — A device that accepts multiple channels on a single transmission line by connecting terminals, one at a time, at regular intervals — interleaving bits (Bit TDM) or characters (character TDM) from each terminal.

**Time-Sharing** — A method of computer operation that allows several interactive terminals to use one computer. Although the terminals are actually served in sequence, the high speed of the computer makes it appear as if all terminals were being served simultaneously.

**Transient** — An abrupt change in voltage, of short duration (e.g. a brief pulse caused by the operation of a switch).

**Trunk** — A single circuit between two points, both of which are switching centers or individual distribution points. A trunk usually handles many channels simultaneously.

**TTD (Temporary Text Delay)** — The TTD control sequence (STX ENQ) transmitted by a sending station when it wants to retain the line but is not ready to transmit.

**Turnaround Time** — The actual time required to reverse the direction of transmission from sender to receiver or vice versa when using a half-duplex circuit. Time is required for line propagation effects, modem timing and computer reaction.

**Two-Wire** — Circuit that indicates information signals in both directions for data carried by the same path.

**TWX® (Teletypewriter Exchange Service)** — A teletypewriter dial network owned by Western Union. ASCII coded machines are used.

**Unbalanced Line** — A transmission line in which the magnitudes of the voltages on the two conductors are not equal in respect to ground; e.g. a coaxial line.

**Unloaded Line** — A line that has no loaded coils that reduce line loss at audio frequencies.

**V.35** — CCITT standard governing data transmission at 48 Kbps using 60-108 KHz group band circuits.

**Voice-Frequency** — Frequency in part of the audio frequency range essential for the transmission of commercial quality speech.

**Voice-Grade Line** — A channel that is capable of carrying voice frequency signals.

**Volatile Memory** — A storage medium that loses all data when power is removed.

**VRC (Vertical Redundancy Check)** — An error-detection scheme in which the parity bit of each character is set to "1" or "0" so that the total number of "1" bits in the character is odd or even.

**VT (Vertical Tabulation)** — A format effector which advances the active position to the same character position on the next predetermined line.

**WACK (Wait Before Transmit)** — The WACK character sequence allows a receiving station to indicate a "temporarily not ready to receive" condition to the transmitting station.

**WATS (Wide Area Telephone Service)** — A service provided by telephone companies in the United States that permits a customer to make calls to or from telephones in specific zones for a flat monthly charge. The monthly charges are based on size of the zone instead of number of calls.

**Wideband** — A communications channel that has a greater bandwidth than voice grade lines.

**X.21** — CCITT standard governing interface between data terminal equipment (DTE) and data circuit terminating equipment (DCE) for synchronous operation on public data networks.

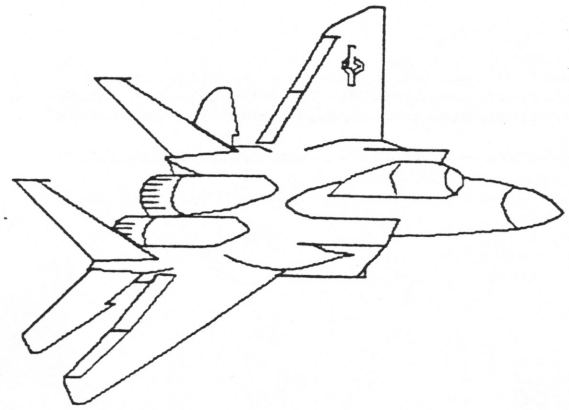
**X.25** — CCITT standard governing interface between data terminal equipment (DTE) and data circuit terminating equipment (DCE) for terminals operating in the packet mode on public data networks.

**X.25 Pad** — A device that permits communication between non-X.25 devices and the devices in an X.25 network.

**X-ON/X-OFF (Transmitter On/Transmitter Off)** — Control characters used for flow control, instructing a terminal to start transmission (X-ON) and end transmission (X-OFF).

# AFFORDABLE PLOTTING FOR

# SCREEN-TO-PLOTTER UTILITY



NOTE: If the above graphics plot sample looks familiar, it is because it appears on the loader screen of Digital Integration's Fighter Pilot program. Transferring it to the plotter, as well as formatting this order form, was done with the SCREEN-TO-PLOTTER utility program and a joystick.
Please write if you have any questions concerning the I/F that I've missed answering or call me at 1-307-742-4530 evenings.

First, thanks for responding to my ad. It just confirms my hunch that, with all the 2068 is capable of doing these days, interfacing to a plotter, for one reason or another, has for too long been beyond the realization of most Timexers. My own low-budget computing forced me to wait for the day to come when I could watch the mechanical magic of a plotter that was being driven by my 2068. I'm happy to announce that the day has finally arrived!

When the Commodore 1520 printer/plotter recently dropped in price to $49.95, I jumped at the now affordable way to make my dream of interfacing to a plotter come true. The job was a little more involved than I had anticipated and I soon had to purchase a used VIC 20 in order to determine what sort of serial signals and timing the 1520 required. With more than my usual luck with projects like this, the interfacing hardware and software were developed and debugged and before long my 2068 was running the 1520 every bit as effectively as the VIC 20 did!

The driver software is written such that every function the 1520 is capable of can be controlled with the 2068's BASIC LPRINT command. It is a simple matter to replace PLOT and DRAW commands in a program with their corresponding LPRINT plotter commands for hi-resolution four color hard-copy graphic plotting.

---------- 1520 Printer/Plotter Specifications: ----------

- High quality plotter mechanism manufactured by ALPS.
- 4 color pens: black, blue, green, and red.
- 4 character sizes: 10, 20, 40, and 80 columns per line.
- 16 dash sizes: from solid line to points separated by 0.2mm.
- 90 degree character rotation possible.
- Switchable char. set: from UPPER/lower to LOWER/upper case.
- Paper width = 4.5" (extra paper & pens avail. at RADIO SHACK)
- Unit size = 9.5"D X 10.75"W X 3.75"H
- X-Y single step resolution = 0.2mm (0.0078 inch)
- Number of X steps = 0 to +479
- Number of Y steps = -998 to +998
- Plotting may be either relative to an "absolute" origin or relative to a redefinable origin.

...NOTE: as of 4/1/87, the 1520 (new in orig. box) is available from ALL ELECTRONICS CORP., P.O. Box 20406, Los Angeles, CA 90006; phone (1-800-826-5432) for $49.95 + $3.00 shipping.

---------- I/F Board Specifications: ----------

Full on-board decoding. (port 63 is used)
Only 4 ICs, 1 cap., a 6-pin DIN plug/4-cond. cable required.
High quality circuit board features plated-through holes.
May be plugged directly into a mother board or, for a small additional cost, a keyed edge connector will be supplied for alternate connection to the 2068's rear bus.

---------- I/F Driver Software Particulars: ----------

M.C. is 255 bytes long & resides in the printer-buffer area. LPRINT works as usual; AT, TAB, & "," are not supported, but may be functionally replaced with the plotter "move" command. LLIST is not supported, but this is no great loss as the 1520 is a hi-resolution color plotter first and a printer second. Plot/print control codes and parameters are sent via a LPRINT handler. i.e.: to draw (pen down) from present pen location to point (0,200) relative to the absolute origin, use the command LPRINT CHR$ 24;"D";x;",200". Note that x and y can be calculated values from within the LPRINT command itself.

Basically, the SCREEN-TO-PLOTTER utility simplified control of the 1520 printer/plotte... way as a word processor program facilitates the print... with a printer. In both cases, the software handles th... sending to the respective devices, data and control codes necessary to plot or print a file, providing, of course, that the appropriate I/F hardware and driver software are in place.

While the SCREEN-TO-PLOTTER program can be compared to a word processor program, it is also a drawing program enabling a user to draw "freehand" an original picture simultaneously to the screen and plotter, or to LOAD an existing SCREEN$ picture from tape and then, in a "connect-the-dots" type of process, trace around the picture with every move duplicated by the plotter and stored in a code block. These plot code blocks may be as large as 8K bytes and able to store a sequence of more than 2700 plotter commands! A block may be LOADed later to reproduce the original "digitized" picture on the plotter in every detail.

The menu, constantly displayed on the bottom two screen lines, offers seven main plotter functions:

Draw Move Text Color x=xxxy=yyy
Quit Page (I=dash E=close Fig.)

Where: Draw, Move, Text, Color, Quit, Page, I, and E are the menu's choices and x=xxxy=yyy display the cursor's current on-screen coordinates. The cursor is controlled by pressing the keyboard direction keys or with a joystick (left side plug).

* Draw: Draws (pen down) from current pen location to current cursor coordinates. A joystick's "fire" button or the "D" key activate this option.
* Move: Moves (pen up) from current pen location to current cursor coordinates. Press the "M" key for this option.
* Text: Allows for text to be printed at the current cursor coordinates. Character size, 90 degree rotation, and auto-centering are selectable before printing. Press "T" key.
* Color: The plotter's pen color is changed with this option to black, blue, green, or red. Screen clear is available as a sub-option. The "C" key activates this option.
* Page: This option advances the plotter's paper just enough to provide a new blank "page" to plot upon. Press the "P" key.
* Dash: This option directs any subsequent drawing (or text) to be plotted in dashed lines. Sixteen different dash sizes are selectable. Press the "I" key to activate this option.
* Close Fig.: This option directs the plotter to draw pen down from its current pen location to the coordinates last "moved" to. It is used to automatically close up the perimeter of a figure. Press the "E" key to choose this option.
* Quit: Returns control to BASIC where you can choose to SAVE the screen and/or plot data block. A previously saved plot code block may also be LOADed & "re-run". Press the "Q" key.

* SCREEN-TO-PLOTTER is compiled w/TIMACHINE® and is very fast. Complete and detailed instructions are included with every copy.

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# ORDER FORM

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